Humor appreciation and sensation seeking: Invariance of findings across culture and assessment instrument?*

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Abstract

It was hypothesized that sensation seeking (SS) is able to predict both the structure and content of jokes and cartoons. Five hypotheses were derived and tested in two samples from Spain and Germany comprising a total of 434 participants. The basic pattern of correlations was replicated for the two samples, and for the different measures of humor appreciation (3-WD, EAHU) and sensation seeking (AISS, SSS). Experience Seeking and Novelty were predictive of low appreciation of incongruity-resolution humor and high appreciation of nonsense humor. Disinhibition and Intensity were positively correlated with funniness of sexual, black, man-disparagement and woman-disparagement humor, and negatively with their aversiveness. When the structure variance from the content categories was removed, the correlations between appreciation of humor contents and sensation seeking increased. This confirmed that structure and content have to be separated both theoretically and empirically in studies of appreciation of content categories.

Keywords: 3-WD; AISS; EAHU; Humor appreciation; sensation seeking; SSS.

1. Introduction

One of the classic topics in the field of humor has been to locate this construct in the space of personality dimensions (Kazarian and Martin 2006; Martin 2007). Indeed, tests of appreciation or creation of humor have been related to personality traits as varied as intelligence, creativity, extraversion, psychoticism, conservatism, or religiosity (Saroglou 2004; Wilson and Patterson 1969). Conceptual analyses suggest that both content and structure contribute to

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the make up of humor stimuli and empirical research confirms pronounced individual differences in appreciation of structural properties of humor and of content. For example, research on personality and humor attempted to predict liking of humor content (e.g. Extraversion is seen as a predictor of liking of sexual humor) and humor structure (e.g. conservatism and intolerance of ambiguity predict liking of humor that provides resolution of incongruity). Among the predictors of humor appreciation sensation seeking is assigned a unique role as it was shown to be predictive of appreciation of both content and structure (Ruch 1988).

1.1. *Sensation seeking as a predictor of humor: A review of findings*

Sensation seeking (SS) has been defined as a trait involving the "seeking of varied, novel, complex and intense sensations and experiences" (Zuckerman, 1994: 27). However, factor analyses have shown that the Sensation Seeking construct is multidimensional. Zuckerman (1979) distinguishes among four components: (a) *Thrill and Adventure Seeking* (TAS) represents the desire to seek sensation through risky sports or activities that produce unusual sensations, such as parachuting or scuba diving; (b) *Experience Seeking* (ES) involves seeking of stimulation through the mind and the senses, through art, travel, even psychedelic drugs, music and the wish to live in an unconventional style; (c) *Disinhibition* (DIS) describes the seeking of sensation through drinking, partying, gambling and sexual variety; and (d) *Boredom Susceptibility* (BS) represents a high aversion to boredom produced by the absence of stimulation from activities or other persons and restlessness as a reaction to boredom. The sensation seeking scale (SSS) is used for the assessment of these components as well as of general sensation seeking.

More recently, Arnett (1994) proposed a different conceptualization of sensation seeking which emphasizes the different stimulus dimensions. Arnett distinguishes between (a) Intensity, which represents the intensity of stimulation of the senses; and (b) Novelty, with items expressing openness to experience. Accordingly, the Arnett Inventory of Sensation Seeking (AISS) is composed of two subscales, Novelty and Intensity, and a total score.

Both conceptualizations have been of interest to the study of humor, although only a few aspects of humor have been studied so far. Humor content and structure may be seen to provide stimulation differing in, for example, complexity and intensity, and hence SS appears to provide a meaningful conceptual framework for appreciation of humor. SS might also relate to humor

performance and humor in social situations. For example, teasing, sarcasm and ridicule in social groups seems to be a highly arousing activity and some people pursue it with delight despite the fact that it may involve social, if not physical risks. Poking fun at authority or the superior, especially in their presence, might be a similar source of fun for the high sensation seeker. However, creative aspects of humor, or performance in situation have not been considered so far. Rather research focused on the aspect of appreciation of humor.

So far, the relationship between SS and humor appreciation has been studied in two ways. One approach has used self-reports of humor responses to hypothetical events (as measured by the *Situational Humor Response Questionnaire*, SHRQ; Martin and Lefcourt 1984), whereas the other approach has utilized ratings of funniness and aversiveness of jokes and cartoons that vary both in content and structure (i.e. the *3WD test of humor appreciation;* Ruch 1992).

The first approach allows covering everyday humorous events (even ones that many subjects might not have experienced in their life before), but the answers refer to likely responses to hypothetical situations. Deckers and Ruch (1992) hypothesized that high SS participants would be better able to cope with risky situations whereas the low SS participants would be less likely to experience positive emotions in such situations. They found for both American and German samples that all SSS subscales and the total score correlated positively with the SHRQ. Lourey and McLachlan (2003) expanded this finding by separating the components of subjective amusement and overt behaviour. They analyzed the relationship between SS as measured by AISS, and two experimental versions of the SHRQ, one to assess overt expression of humor, and the other one to assess perceived funniness, to hypothetical situations. Results showed that high SS obtained higher scores in perceived funniness and overt expression. However, partial correlations indicated that Intensity was related with overt expression of humor but not with scores on perceived funniness, and vice versa, Novelty was related with perceived funniness, but not with overt expression.

The second approach allows assessing the actual response or performance of individuals. The 3-WD was developed through numerous studies, fundamentally based on factor analysis and using diverse samples (Ruch 1992). This test is used to differentiate three stimulus dimensions and two response dimensions. On the stimulus side two of the factors relate to the structure of humor and one, sexual humor, to the content. While the factor of sexual humor is not surprising, the emergence of factors reflecting different cognitive processes isolated as a response to the internal structure of the jokes or cartoons were. In one of the dimensions, incongruity-resolution humor (INC-RES), a two-stage

process can be observed, consisting of the perception of an incongruity and its resolution. Nonsense humor (NON) also has incongruous punch line, however, "the punch line may 1) provide no resolution at all; 2) provide a partial resolution (leaving an essential part of the incongruity unresolved), 3) or actually create new incongruities" (McGhee et al. 1990: 124). As factor analysis of affective responses to humor yielded the two orthogonal dimensions of positive and negative responses, each jokes or cartoon of the 3-WD are rated for funniness and aversiveness. Thus, the 3-WD provides a profile containing six scores: three for funniness of incongruity-resolution, nonsense and sexual humor (i.e. INC-RES_f, NON_f, and SEX_f) and three for their aversiveness (i.e. INC-RES_a, NON_a, and SEX_a).

Several hypotheses linking SS and its components and appreciation of humor structure and content were put forward and tested in a series of studies involving participants from three European countries involving altogether about 600 participants (Forabosco and Ruch 1994; Ruch 1988). Three of the hypotheses referred to the structural features, and it was predicted that SS correlates positively with 3-WD NON_f, negatively with INC-RES_f, and negatively with NON_a. This is based on the fact that nonsense humor offers more stimulation than incongruity-resolution humor in both the incongruity as well as in the resolution stage (Ruch 1988). Furthermore, it was postulated that the three hypotheses will be mainly connected with ES; i.e. the seeking of complex and novel stimulation through the mind and the senses was expected to be the strongest predictor of appreciation of the structural properties in humor. This prediction was in line with other findings showing that ES was the best predictor of appreciation of different aesthetic objects (including different music styles, designs, or semi-abstract art), which differ with regard to collative variables (Zuckerman 1994).

A further hypothesis states that DIS will correlate positively with funniness of the sex category and negatively with its aversiveness. As Zuckerman (1994) suggested that DIS relates to the intensity dimension of stimulation, and sexual content represents one of the most intensive stimulation obtainable in humor it was predicted that high disinhibitors tolerate stimulation by highly tendentious humor as they tolerate intensive stimulation by other objects. However, testing is impaired as both content and structure contribute to the variance of appreciation of humor (Carretero-Dios 2005; Carretero-Dios et al. 2009; Ruch and Hehl 2007). While the hypothesis is related to appreciation of content, it is usually tested with a total score for the subscale (to which also the structure variance contributes). Thus, Ruch (1988) suggested that for a more precise testing of the content-related hypothesis the structure variance needs to be removed

(e.g. by computing partial correlations, difference scores, or by analyzing residuals).

These hypotheses were tested in Austrian, German and Italian samples. While not all correlations were significant for each sample, they were all in the expected direction and most often significant. Thus, it is safe to conclude that SS (and particularly ES) is a predictor of appreciation of humor structure (presumably via the complexity/novelty link) and DIS a predictor of humor content (presumably via the intensity dimension of stimulation).

1.2. *Sensation seeking and humor appreciation: Unresolved issues and new research questions*

In spite of the fact that the link between humor appreciation and sensation seeking has been substantiated by different studies, at least four limitations remain. First, not every hypothesis has been confirmed in all countries; therefore it is not clear which results are invariant and which ones are not. Studying more (preferably non western) countries would allow evaluating how universal the role of SS in humor is. Extensions of the findings in the same culture are desirable too. For example, the German samples tested so far were composed of students. Secondly, so far the results are based on one set of jokes and cartoons that have been translated into different languages. It might well be that peculiarities of the selection of jokes do play a role, and the findings do not hold for other jokes of the same putative categories. It might be worthwhile to study the relationships using a different test of humor appreciation. Now such a test is available, as Carretero-Dios et al. (2010) introduced new assessment tool named EAHU (from *Escala de Apreciación del Humor* [Humor Appreciation Scale]). The EAHU is used to differentiate six empirically isolated humor factors: incongruity-resolution (INC-RES), nonsense (NON), sexual (SEX), black (BLACK), men-disparagement (M-DIS), and women-disparagement humor (W-DIS). The items consist of jokes and graphic cartoons which should be rated for degree of funniness and aversiveness. The INC-RES, NON, and SEX factors of the EAHU were adaptations of Ruch's theoretical framework. The BLACK, M-DIS and W-DIS factors, however, were obtained with the aim of empirically isolating further humor contents.

Thirdly, research so far has shown that the nature of the components of SS has been crucial. ES does predict liking of humor structure and DIS predicts liking of sexual content, but not vice versa. Moreover, it was argued that the crucial variable underlying the relationship between DIS and sexual humor

is intensity, whereas the relationship between ES and structure is based on complexity and perhaps novelty. So, it might be of interest to examine those aspects directly by using the conceptualization of SS by Arnett (1994). The use of the AISS might help to broaden and refine the links between SS and humor appreciation in as much as it provides separate measures of Intensity and Novelty, which are relevant for the prediction of humor content and structure, respectively.

Finally, the factor analytic studies leading to the 3-WD humor test did not find the various humor categories (e.g. aggressive, scatological black etc) proposed in the literature (e.g. Herzog and Anderson 2004; Herzog et al. 2006; Maxwell 2003) although such cartoons and jokes were in the material studied. Nevertheless, while those contents do not appear as major factors in humor it might still be interesting to relate the content variance of such humor categories to SS (even if they reflect only a smaller proportion of the total reliable scale variance). The EAHU does incorporate three further content related humor. Black (or macabre) humor, men-disparagement and women-disparagement humor reflect challenging topics (i.e. the macabre, put down of people), which may relate well to the intensity dimension of stimulation. Therefore, their inclusion might add more facets to the study of the relationship between Disinhibition (SSS) and Intensity (AISS) on one hand and humor content on the other. However, for a successful testing of those hypotheses, it is necessary to use an index that reflects liking of content (i.e. by partialling out the effects of structure from the total scores of the scales).

1.3. *Aim of the present study*

The aim of the present study is to provide further support for the proposed relationship between SS and appreciation of humor content and structure. Most importantly, the testing of the basic pattern of correlations will be extended to samples not considered before, namely to samples of Spanish and German adults. Moreover, testing the hypotheses will involve varying the assessment instrument of both humor appreciation and of SS. Finally, one aim is to expand the testing of the hypotheses to new components of SS and further humor content categories. In detail, five (sets of) hypotheses are proposed:

Hypothesis 1: SS is a predictor of humor structure. The total score of both sensation seeking scales will correlate negatively with funniness of incongruity-resolution humor (Hypothesis 1a), positively with funniness of nonsense

humor (Hypothesis 1b), and negatively with aversiveness of nonsense humor (Hypothesis 1c).

Hypothesis 2: ES is the subscale of sensation seeing that is the best predictor of the structure appreciation. ES will be positively correlated with NON_f, and negatively with INC-RES_f and NON_a.

Hypothesis 3: DIS is a predictor of appreciation of humor content. It will be positively correlated with funniness of sexual humor (Hypothesis 3a) and negatively with its aversiveness (Hypothesis 3b). This hypothesis will be tested for the regular scales of the 3-WD and the EAHU. However, as the hypothesis specifically relates to the content of humor, the variance due to the structure will be removed for a more precise testing.

Hypothesis 4: AISS Intensity will correlate with appreciation of sexual humor. There will be a positive correlation with funniness and a negative with aversiveness. Novelty will relate positively to funniness of nonsense and negatively with aversiveness.

Hypothesis 5: DIS and Intensity will be predictors of the black and disparaging humor contents. These hypotheses will only be tested for the appreciation of content index (with the structure variance removed). A positive correlation is expected for funniness of sexual, black, and disparaging humor and negative ones for their aversiveness.

In should be noted that, in part, the hypotheses include both the (reduced) funniness and (enhanced) aversiveness of a humor category. Indeed, individuals differ in their use of the funniness and aversiveness scales. This is not surprising, as also general positive and negative affectivity are orthogonal. Therefore, for some people disliking of a humor category (e.g., sexual content) might reduce the level of funniness, while for others it might enhance aversiveness.

2. Method

2.1. *Participants*

Two samples were employed. Sample 1 was collected in Spain and consisted of 323 participants (141 males, 182 females) aged between 18 and 77 years ($M = 33.51$, $SD = 14.52$). 180 participants were university students from the University of Granada and 143 were non-students. Sample 2 consists of 44 male and 66 female German adults. Their age ranged between 19 and 77 years ($M = 37.14$, $SD = 13.46$).

2.2. *Instruments*

Sample 1 answered version V of the *Sensation Seeking Scale* (SSS-V; Zuckerman 1994), the *Arnett Inventory of Sensation Seeking* (AISS; Arnett 1994) and the *EAHU* humor test (Carretero-Dios et al. 2010). The latter consists of 32 jokes and cartoons which are rated on 2 unipolar 5-point scales for "funniness" (from 0 = not at all funny, to 4 = very funny) and "aversiveness" (from 0 = not at all aversive, to 4 = very aversive). Twelve scores can be derived: six for funniness of incongruity-resolution, nonsense, sexual, black, man-disparagement and woman-disparagement humor (i.e. INC-RES$_f$, NON$_f$, SEX$_f$, BLACK$_f$, M-DIS$_f$ and W-DIS$_f$) and six for their aversiveness (i.e. INC-RES$_a$, NON$_a$, SEX$_a$, BLACK$_a$, M-DIS$_a$ and W-DIS$_a$). Each one of the humor categories contains six items, except for women and men-disparagement humor, with four items each.

Sample 2 answered a German translation of the SSS-IV (Zuckerman 1979) and the 3-WD humor test (Ruch 1992). The 3-WD consists of 35 jokes and cartoons, which are rated on two unipolar 7-point scales for "funniness" and "aversiveness". Six scores can be derived: three for funniness of incongruity-resolution, nonsense, and sexual humor (i.e. INC-RES$_f$, NON$_f$, and SEX$_f$) and three for their aversiveness (i.e. INC-RES$_a$, NON$_a$, and SEX$_a$).

2.3. *Procedure*

To collect sample 1 and sample 2 an incidental sampling was carried out. A booklet containing the different questionnaires was handed out to participants. The reported testing time varied from 30 to about 50 minutes.

3. Results

Descriptive statistics (Means, standard deviation, minimum and maximum) as well as reliability estimates (Cronbach's alpha) were computed for the SSS-V, AISS, EAHU and 3-WD humor test. The results are given in Table 1.

Table 1 shows that Cronbach's alpha was sufficiently high for most of the scales used. However, the internal consistency of the BS and Novelty scales was rather low. The humor categories were roughly comparable with respect to mean funniness level. However, in the German sample the sexual

Table 1. *Descriptive statistics for the EAHU, SSS-V, AISS and 3WD*

	M	SD	α
Spanish sample			
EHAU			
$INC\text{-}RES_f$	15.01	4.68	.75
NON_f	8.67	5.67	.81
SEX_f	12.25	5.29	.80
$BLACK_f$	7.22	5.49	.81
$M\text{-}DIS_f$	8.28	3.52	.69
$W\text{-}DIS_f$	5.86	3.75	.72
$INC\text{-}RES_a$	1.51	3.76	.81
NON_a	1.70	4.23	.92
SEX_a	6.04	5.97	.88
$BLACK_a$	16.11	6.27	.84
$M\text{-}DIS_a$	4.53	3.80	.73
$W\text{-}DIS_a$	6.97	4.70	.81
Funniness	57.18	18.34	.92
Aversiveness	37.76	20.35	.95
SSS-V			
TAS	5.71	2.23	.84
DIS	4.31	2.17	.61
ES	5.71	2.23	.66
BS	3.01	1.53	.45
SSS-V Total	34.01	18.80	.87
AISS			
Intensity	22.12	4.95	.62
Novelty	25.66	4.48	.55
Total AISS	47.78	8.17	.69
German sample			
3-WD			
$INC\text{-}RES_f$	27.54	12.84	.89
NON_f	24.45	10.60	.80
SEX_f	20.58	13.11	.89
$INC\text{-}RES_a$	7.55	9.98	.88
NON_a	11.47	12.16	.88
SEX_a	22.19	16.88	.92
Funniness	72.57	27.90	.90
Aversiveness	41.22	33.18	.94
SSS-IV			
TAS	5.77	3.28	.77
ES	10.37	3.63	.73
DIS	4.49	2.75	.71
BS	4.85	2.17	.54
SSS-V Total	25.48	9.38	.88

Note: Spanish sample $N = 323$. German sample $N = 111$.

humor category was much higher in aversiveness than the two structure-based humor categories. In the Spanish sample sexual, black, man-disparagement and woman-disparagement humor were much higher in aversiveness than incongruity-resolution and nonsense humor. The content categories of EAHU can be arranged according to the degree of aversiveness from high to low: black, woman-disparagement, sexual and man-disparagement humor. There is no deviation from normality for all funniness scales and for aversiveness of content categories of the 3WD and the EAHU. However, aversiveness of the structure dominated scales (incongruity-resolution and nonsense humor) of both humor tests deviate from normality. These two scales also have a low mean.

Next the correlations between the EAHU scales and socio-demographic variables and SS were computed for the Spanish sample. In order to eliminate the structure variance from the humor categories, regression analysis with nonsense and incongruity-resolution as predictors and the different content scales as criteria were performed and the residuals were used for the correlations. The results for funniness and aversiveness are presented in Tables 2 and 3, respectively.

Tables 2 and 3 show that the older participants considered incongruity-resolution humor funnier, and nonsense humor more aversive than the younger ones. Lower age went along with higher scores in SEX_f and $M\text{-}DIS_f$, but also $BLACK_a$ and $W\text{-}DIS_a$. Males judge sexual, black and woman-disparagement humor funnier and less aversive than females do. Furthermore, females find man-disparagement humor funnier than males.

Most importantly, Tables 2 and 3 confirm the expected pattern of relationship between SS and humor. The sensation seeking total scores correlated negatively with $INC\text{-}RES_f$ and NON_a, and positively with NON_f (the latter was significant for AISS total only) confirming Hypothesis 1. The same pattern can be found for ES, and only for experience seeking. As expected by Hypothesis 2, ES correlated significantly negatively with $INC\text{-}RES_f$ and NON_a and positively with NON_f.

Tables 2 and 3 confirm that DIS correlated positively with appreciation of sexual humor confirming Hypothesis 3. Furthermore, SEX_a and $M\text{-}DIS_a$ also correlated negatively with SS total. Furthermore, AISS Intensity correlated negatively with INC-RESf; i.e. resolvable types of humor are considered funnier by individuals that tend to prefer stimuli of lower intensity levels in general. However, there is no correlation with SEX_f or SEX_a. The high novelty seeker appreciated nonsense; the Novelty subscale of the AISS correlated positively with NON_f and negatively with NON_a.

Table 2. *Intercorrelation between sex, age and sensation seeking, and the funniness scores of the EAHU scales and indices*

	$INC\text{-}RES_f$	NON_f	SEX_f	$BLACK_f$	$M\text{-}DIS_f$	$W\text{-}DIS_f$	SEX_f-resid	$BLACK_f$-resid	$M\text{-}DIS_f$-resid	$W\text{-}DIS_f$-resid
Age	.23***	.08	−.14*	.05	−.27***	.03	−.25***	.02	−.37***	−.09
Sex[a]	.08	.02	−.21**	−.34***	.17**	−.44***	−.26***	−.35***	.19**	−.48***
SSS-V										
TAS	−.10	.09	.02	.06	.07	.06	.10	.12*	.14**	.16**
ES	−.14**	.13*	.02	.01	.07	.03	.17**	.04	.21**	.08
DIS	−.07	.05	.17**	.14**	.06	.09	.27***	.16**	.12*	.17**
BS	−.09	.01	.01	.09	.08	.06	.07	.10	.10	.12*
SSS-V Total	−.15**	.10	.05	.09	.10	.09	.20**	.15*	.19**	.18**
AISS										
Intensity	−.16**	−.04	.04	.15**	.09	.13*	.25***	.27***	.16**	.31***
Novelty	−.06	.17**	.13*	.01	.16**	.09	.21**	.08	.21**	.17**
AISS Total	−.13*	.12*	.10	.09	.15**	.13*	.28***	.20**	.20**	.28***

Note: $N = 323$. [a] (1 = male; 2 = female); resid = residual.
Key: * $p < .05$; ** $p < .01$; *** $p < .001$

Table 3. *Intercorrelation between sex, age and sensation seeking, and the aversiveness scores of the EAHU scales and indices*

	$INC\text{-}RES_a$	NON_a	SEX_a	$BLACK_a$	$M\text{-}DIS_a$	$W\text{-}DIS_a$	SEX_a -resid	$BLACK_a$-resid	$M\text{-}DIS_a$-resid	$W\text{-}DIS_a$-resid
Age	−.09	.15**	.10	−.18**	.03	−.15**	.16**	−.14**	.04	−.15**
Sex[a]	.08	−.01	.27***	.29***	.08	.48***	.25***	.25***	.04	.48***
SSS-V										
TAS	−.07	−.15**	−.15**	−.06	−.10	−.08	−.21**	−.05	−.09	−.10
ES	−.07	−.23**	−.27***	−.04	−.13*	−.08	−.28***	.05	−.08	.01
DIS	−.06	−.06	−.26***	−.05	−.09	−.06	−.34***	−.02	−.07	−.04
BS	−.02	−.02	−.07	−.04	−.05	−.03	−.13*	−.05	−.08	−.07
SSS-V Total	−.09	−.18**	−.27***	−.06	−.14**	−.09	−.33**	−.02	−.10	−.06
AISS										
Intensity	−.02	−.07	.01	−.08	−.05	−.02	−.17**	−.12*	−.07	−.15**
Novelty	.01	−.21**	−.14**	−.01	−.19**	−.08	−.19**	−.02	−.16**	−.11*
AISS Total	−.01	−.17**	−.08	−.04	−.14**	−.06	−.21**	−.08	−.13*	−.15**

Note: $N = 323$. [a] (1 = male; 2 = female); resid = residual.
Key: * $p < .05$; ** $p < .01$; *** $p < .001$

Finally, both DIS and AISS Intensity correlated positively with funniness of sexual, black, and men- and women-disparaging humor (Table 2). Aversiveness of sexual content in humor correlated negatively with DIS and AISS Intensity; however, while all of the correlations with black, and men disparaging and women disparaging humor were negative only two were significant (Table 3).

Are the correlations between DIS/Intensity and sexual humor simply based on content overlap or more substantial? To answer question the individual items of the DIS and the AISS Intensity scales were correlated with funniness of the residual scores. For DIS, the highest correlations were obtained for sensation seeking items involving sexuality. Sexual content in humor is preferred by people endorsing the items "I like to date persons who are physically exciting" ($r = .26$, $p < .001$) and "I enjoy watching many of the 'Sexy' scenes in movies" ($r = .32$, $p < .001$). However, the AISS Intensity scale does not have any items relating to sex and the highest correlations were with liking to see "Movies with a lot of explosions" ($r = .30$, $p < .001$) and "Work better under pressure" ($r = .20$, $p < .01$). For black humor there seems to be a content overlap as the two highest correlations were obtained for "Movies with a lot of explosions" ($r = .31$, $p < .001$) and "See a car accident" ($r = .23$, $p < .001$). Furthermore, several stepwise regression analyses were computed with DIS and Intensity as predictors and the residual scores of all contents as criteria. In each case both predictors entered the equation and the multiple correlations ranged from .17 (men-disparaging humor) to .31 (women-disparaging humor). Also, the correlation between DIS and Intensity was unusually low ($r = .43$, $p < .001$), although not much lower than in others studies (e.g. Ferrando and Chico 2001). Thus, the two scales are not redundant in their prediction of appreciation of content, but rather complement each other.

The funniness and aversiveness scales of the 3-WD were correlated with the socio-demographic variables and the SSS-IV for the German sample. Likewise, the residuals for funniness and aversiveness of humor content were derived and used in the correlations (see Table 4).

Table 4 shows that nonsense humor was judged funnier by the younger and INC-RES humor was found funnier by the older participants. Age also correlates positively with aversiveness of nonsense and sexual humor. Females tend to find sexual humor more aversive but there is no difference regarding funniness.

$INC\text{-}RES_f$ correlated negatively with the SS total scale and ES (but also all other SS subscales). NON_f correlated positively with ES (and other subscales, but none of the correlations were significant) and NON_a correlated negatively

Table 4. *Intercorrelation between sex, age and sensation seeking, and 3WD scales*

	$INC\text{-}RES_f$	NON_f	SEX_f	$INC\text{-}RES_a$	NON_a	SEX_a	SEX_f-resid	SEX_a-resid
Age	.28**	−.20*	−.10	.03	.21*	.21*	−.23*	.22*
Sex[a]	.19*	−.11	−.04	.05	.25**	.17#	−.13	.17#
SSS-IV								
TAS	−.23*	.08	−.02	−.01	−.24*	−.17#	.09	−.10
ES	−.39***	.00	−.17#	−.04	−.23*	−.12	.01	−.07
DIS	−.42***	.08	.05	−.04	−.27**	−.38***	.27**	−.37***
BS	−.39***	.13	−.21*	−.12	−.38***	−.16#	−.05	−.03
SSS-IV Total	−.44***	.08	−.10	−.06	−.34***	−.26**	.10	−.17#

Note: $N = 111$. [a] (1 = male; 2 = female); resid = residual
Key: # $p < .05$ (one-tailed); * $p < .05$; ** $p < .01$; *** $p < .001$

with SS. The correlation between DIS and funniness of sexual content (residual score) was highly significant. Finally, DIS correlated significantly negatively with aversiveness of sexual humor confirming Hypothesis 3.

4. Discussion

In general the present study provides further support for the proposed relationship between sensation seeking and appreciation of humor content and structure. The basic pattern of correlations was replicated for a German sample of adults, and — more importantly — replicated in the Spanish sample. The findings were obtained for a different assessment instrument of humor (the EAHU), and extended to a different measure of sensation seeking (the AISS). Furthermore, the relationship between DIS and funniness of humor content was found for content categories other than sex. As in prior studies, the coefficients tended to be low and partly overshadowed by other effects, so that special indices were employed to verify the proposed relationship. Having varied the language, culture and both assessment instruments the chances of the expected correlations to emerge and be significant are rather low unless the relationship is a rather robust one. Still, more studies are needed to speak of invariance of findings in the relationship between sensation seeking and humor structure and content. Also, we need to address the issue why some of the correlations are rather low.

The fact that the hypotheses could be confirmed for the EAHU is striking, as none of the 3-WD items are used in the EAHU. So far correlations between the corresponding scales of the 3-WD and the EAHU have not been obtained, and therefore one can only speculate about convergent validity. Nevertheless, the results found for the EAHU do indirectly validate the definition of the 3-WD factors. The 3-WD jokes and cartoons have recently been analyzed from the perspective of linguistics leading to an update of the definition (Hempelmann and Ruch 2005).

The first set of hypotheses related SS to appreciation of humor structure. The high sensation seeker (as defined by the SSS in both countries and the AISS in Spain) found incongruity-resolution humor less funny (Hypothesis 1a) and nonsense humor less aversive (Hypothesis 1c) than the low sensation seeker. This confirms that people who like low levels of arousal in general also tend to enjoy the closure provided by resolving an incongruity in humor and tends to dislike residual incongruity. The correlation between SS and nonsense was positive throughout, but only reached significance for the AISS total score but

not the SSS. However, there is a positive correlation between funniness of nonsense and experience seeking in the Spanish sample confirming that ES is the subscale most strongly affiliated with appreciation of structural features of humor (Hypothesis 2). AISS Novelty correlated positively with NON_f and negatively with NON_a. Nonsense humor does not provide clear resolutions, and the resolution of an incongruity often introduces a new incongruity. Those cartoons are often absurd, bizarre and grotesque and seem to be preferred by novelty seekers for just that reason while low novelty seekers find those elements aversive. The resolution of incongruity in the first structural factor often draws on stereotypes (blondes are stupid, Scots are stingy) and other information that is not novel to the recipient. However, this did not lower funniness, or enhanced aversiveness. Typically, Novelty and openness to experience are correlated (Arnett 1994) and they overlap on their prediction of appreciation of nonsense (Ruch and Hehl 2007).

Appreciation of sexual humor is higher among those scoring high in the DIS component of sensation seeking (Hypothesis 3) and AISS Intensity (Hypothesis 4), although the two variables are not redundant in their prediction. The analysis of individual items showed that it is this may be partly due to content overlap; i.e. sexual topics in the questionnaire items predicting liking of sexual topics in humor. For DIS it is primarily the items with sexual content that yield significant higher correlations, however, the AISS Intensity scale does not contain items referring to sex and the correlation is based on intensity items other than sex. Multiple regression analysis also demonstrated that the two scales only partly overlap in their prediction of appreciation of content. Thus, the present study cannot give a definite answer to the question whether the relationship between SS and appreciation of sexual content in humor is due to the content overlap or due to the intensity dimension of stimulation.

A similar conclusion needs to be drawn with respect to the other humor contents of the EAHU. Disinhibition and Intensity seem to be predictors of funniness of humor contents beyond sex; Intensity also predicts their aversiveness (Hypothesis 5). However, more studies are needed to settle this question. Ideally, the DIS and Intensity scales will be supplemented by interest scales matching the humor contents (e.g. interest in macabre, scatological, disparaging topic). Also, the psychometric problems of the DIS and Intensity scales should be taken care of. Finally, it is essential that further studies of appreciation of humor content take into account that both content and structure generate variance, and hence use indices of humor content.

Clearly, the two measures of sensation seeking are not highly overlapping. It should be noted, that there is a difference in the definition of sensation seeking

by the two authors. While Arnett defines SS as a basal need for stimulation, Zuckerman (1994) rejected his own definition of sensation seeking as a need (Zuckerman 1979), because the term "need" implied "compulsion." Furthermore, it should be added that the AISS, despite being the more recent scale, has its problems too. As shown in previous studies (e.g. Andrew and Cronin 1997; Arnett, 1998; Lourey and McLachlan 2003; Roth and Herzberg 2004) the AISS has two limitations: (1) the low reliabilities (mostly alpha <.60) and (2) the validity of the subscale "novelty" must be viewed with some scepticism. In the previous studies (see above) no behaviour has been identified which is connected solely to novelty and not to intensity. Also in the present study the AISS scales yielded low alphas. Future studies of humor and sensation seeking therefore should not rely exclusively on the AISS.

Despite the consistency of findings across countries one may still question whether SS is an essential variable. For example, one can argue that the correlations between ES and the structural factors are low. However, one has to consider that both the SS scales and humor scales are positively intercorrelated themselves leaving little room for specific relationships. Yet ES is expected to correlate with the structure and not with content of humor, and DIS correlates with the content but not necessarily with the structure. Most importantly, however, ES is expected to correlate positively with appreciation of nonsense and negatively with appreciation of incongruity-resolution humor. Those correlations have a fair chance to be high if INC-RES and NON were negatively correlated. However, they correlate positively in the .30 to .40 range, making it impossible that any third variable would show a higher correlation to both. Perhaps SS determines the relative preference of one humor type over the other, and this is best assessed by the structure preference index. It might be that factors, such as mood or rating styles, but also liking of humor in general, create variance that makes INC-RES and NON correlate positively. Thus, future studies need to involve multi-component prediction of humor.

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Notes

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